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Small arms

Note by the Secretary-General

By its resolution 52/38 J of 9 December 1997, the General Assembly requested the Secretary-General to prepare a study on the problems of ammunition and explosives in all their aspects. Pursuant to that resolution, the Secretary-General has the honour to submit to the Assembly the report of the Group of Experts on the problem of ammunition and explosives.

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Letter of transmittal dated 5 June 1999 from the Chairperson of the Group of Experts on the problem of ammunition and explosives addressed to the Secretary-General

I have the honour to submit herewith the report of the Group of Experts on the problem of ammunition and explosives. The Group was established by you in pursuance of paragraph 3 of General Assembly resolution 52/38 J of 9 December 1997.

In April 1998, you appointed, on the basis of their personal expertise and on equitable geographical representation, the following experts:

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The report was prepared between 27 April 1998 and 5 June 1999. During that period, the Group held three sessions in New York: the first from 27 April to 1 May 1998, the second from 11 to 15 January 1999 and the third from 1 to 5 June 1999.

The Group wishes to express its appreciation for the excellent support which it received from members of the Secretariat. It expresses its thanks to the Under-Secretary-General for Disarmament Affairs, Mr. Jayantha Dhanapala. Its special appreciation goes to Mr. Francesc Claret who served as the Secretary of the Group.

I have been requested by the Group of Experts on the problem of ammunition and explosives, as its Chairperson, to submit to you, on its behalf, the present report, which was adopted unanimously.

(*Signed*) Silvia **Cucovaz de Arroche**
Chairperson of the Group of Experts on the problem of ammunition and explosives

Report of the Group of Experts on the problem of ammunition and explosives

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I. Introduction

1. The purpose of the present report is to determine what role, if any, could be played by controls on ammunition and explosives in pursuit of efforts to stem the negative impacts associated with the uncontrolled dissemination and abuse of small arms and light weapons. It seeks to provide a basis on which to decide whether controls on ammunition and explosives are options worth pursuing, or whether they should be discarded in favour of other more effective measures.

2. The General Assembly, in paragraph 3 of its resolution 52/38 J of 9 December 1997, entitled "Small arms", requested the Secretary-General to initiate a study on the problems of ammunition and explosives in all their aspects, as early as possible, within available resources, and in cooperation with appropriate international and regional organizations as necessary.

3. In the same resolution, the General Assembly endorsed the recommendations contained in the report of the Panel of Governmental Experts on Small Arms, appointed by the Secretary-General pursuant to General Assembly resolution 50/70 B of 12 December 1995 (A/52/298). In paragraph 80 (m) of its report the Panel had recommended that the United Nations should initiate a study on all aspects of the problem of ammunition and explosives.

4. In April 1998, the Secretary-General appointed, on the basis of their personal expertise and equitable geographical representation, a group of eight experts from Argentina, Finland, Ireland, Slovakia, South Africa, Switzerland, the United States of America and the United Nations Institute for Disarmament Research.

5. The Group of Experts held three sessions at United Nations Headquarters in New York, under the auspices of the Department for Disarmament Affairs: the first from 27 April to 1 May 1998, the second from 11 to 15 January 1999 and the third from 1 to 5 June 1999.

6. The Group took full account of the work carried out by the Panel of Governmental Experts on Small Arms and of its report of 27 August 1997 (ibid.) and duly noted the Panel's references to the issues of ammunition and explosives in paragraphs 29 and 30 of the report. The work of the Group was designed to complement, rather than to duplicate, the report of the Panel of Governmental Experts. Likewise, the Group was kept informed of the ongoing activities of the Group of Governmental Experts on Small Arms, appointed in April 1998.

7. At its first session, the Group adopted the following formulation of its aims: "Without prejudice to the legitimate possession, trade and use of ammunition and explosives, the Group will seek to assess whether and how enhanced controls of ammunition and explosives can contribute to preventing and reducing the excessive and destabilizing accumulation and proliferation, as well as the abuse, of small arms and light weapons."

8. The Group collected and assessed the fullest possible range of relevant information and research materials and prepared a questionnaire on matters related to ammunition for small arms and light weapons and to explosives. The questionnaire was sent on 1 July 1998 to all States Members of the United Nations, as well as to selected international bodies, and research and non-governmental organizations. The Group took due account of the answers to the questionnaire provided by 32 countries.[1]

9. In carrying out its task, the Group quickly became aware of one major impediment, the insufficiency and unavailability of existing information on matters related to ammunition for small arms and light weapons and explosives in all their aspects. Existing sources of available information were fragmentary and often contradictory, even on such elementary data as:

- The locations and numbers of ammunition production facilities in the world;
- The directions and volumes of international trade in ammunition;
- The extent of ammunition stocks legitimately held for the needs of armed and security forces;
- The existence and scale of any ammunition stocks designated as surplus or obsolete;
- Information on explosives incidents, explosives production and usage.

10. The replies received to the Group's questionnaire were too low in number and insufficient in content to compensate for the shortcomings of existing sources of information. As a result, the present report represents the Group's considered collective opinion, based on the experience and knowledge of its membership, as well as on a critical cross-examination of a variety of available primary and secondary sources and field research.

11. The Group finds that controls on ammunition and explosives would not be sufficient to address the problems identified by the report of the Panel of Governmental Experts on Small Arms. Equally, the Group is of the view that attempts to address small arms and light weapons would be

incomplete if they did not include due regard for ammunition and explosives. Ammunition and explosives controls cannot be the sole remedy, but left unaddressed, they could represent a serious flaw and a missed opportunity.

II. *Matériel* addressed in the present report

A. Ammunition

12. "Ammunition" is a broad generic term for all missiles and devices used for offence and defence. It includes explosive and non-explosive components and covers a very wide spectrum of items. This report deals with explosives and with the ammunition for small arms and light weapons defined in paragraph 26 of the report of the Panel of Governmental Experts on Small Arms (A/52/298), namely:

(a) *Small arms*:

(i) Revolvers and self-loading pistols;

(ii) Rifles and carbines;

(iii) Sub-machine-guns;

(iv) Assault rifles;

(v) Light machine-guns;

(b) *Light weapons*:

(i) Heavy machine-guns;

(ii) Hand-held under-barrel and mounted grenade launchers;

(iii) Portable anti-aircraft guns;

(iv) Portable anti-tank guns, recoilless rifles;

(v) Portable launchers of anti-tank missile and rocket systems;

(vi) Portable launchers of anti-aircraft missile systems;

(vii) Mortars of calibres of less than 100 mm.

13. The types of ammunition most commonly encountered in conflict areas and illicit activities are small arms ammunition (i.e., ammunition for weapons such as pistols, rifles and machine-guns below 20 mm in calibre), rocket-propelled grenades, light mortar rounds and improvised explosive devices. It is therefore on these types of ammunition and explosives that the Group has chosen to focus.

14. Ammunition refers to the complete round/cartridge or its components, including bullets or projectiles, cartridge cases, primers/caps and propellants that are used in any small arm or light weapon. The main components of a round/cartridge of small arms and light weapons ammunition are briefly described in annex I to the present report.

B. Explosives

15. Explosives fall under the general definition of ammunition, and in many ways the two are inextricable since most ammunition has explosive components (including propellants, primers, fuzes and fillings). They are commonly used, both militarily and industrially, are widely available and have been used in many conflict, terrorist and criminal activities and situations. It should be noted that bulk military and industrial explosives, dud shells, recycled landmines and a wide variety of improvised explosives have all been used as component parts of explosive devices used worldwide to cause widespread death and destruction.[2]

16. The main types of explosives addressed by the Group are military high explosives (in particular, plastic explosives), industrial explosives such as those used in the mining industry, improvised or "home-made" explosives and particularly explosive initiators, namely detonators (blasting caps).[3]

III. Manufacture of ammunition and explosives

A. Ammunition manufacture

17. The manufacture of small arms ammunition can vary from relatively unsophisticated "bench top" assembly such as reloading or handloading to fully automated computer numerical control (CNC) production, with raw material flowing in at one end and fully assembled ammunition emerging at the other. The following is a description of the main types of manufacture:

Handloading/reloading

18. This type of manufacture of small arms ammunition is usually performed by legitimate target or sport shooters. The equipment, materials and components are simple and easy to acquire commercially. The process involves reusing fixed cartridge cases by re-sizing the case, replacing the spent primers, filling the required amount of propellant and

seating a new bullet. Although this type of manufacture is widespread, the production volume and rates are low compared to the industrial processes described below. Thus, the Group did not regard handloading/reloading as significant for the purposes of the present report.

Industrial manufacture

19. This can vary from assembly plants (which assemble ammunition from components supplied from elsewhere) to production plants (which both manufacture the components and assemble them into finished ammunition). Much of the small arms ammunition machinery currently in use dates back to the Second World War. In the more industrially advanced countries, use is made of CNC machinery, which can produce high volumes of high-quality ammunition and can also switch quickly from one type and calibre to another with little loss of production time. In larger ammunition, empty shells, mortar bombs and cartridge cases can be manufactured in dedicated plants and then moved to filling plants for explosive filling and final assembly. These processes are usually separated for explosive safety reasons. It is also common to have dedicated plants specializing in the production of propellants, fuzes, detonators, primers and bulk high explosives for the same reason.

Surge production

20. Industrial ammunition manufacturing plants rarely operate at maximum capacity in peacetime. By way of illustration, three respondents to the Group's questionnaire indicated that their maximum production capacities exceeded their average annual production by factors of 2.62 to 12.40. Wartime or emergency surge production is achieved by bringing additional assembly lines into use which might otherwise be "mothballed" and lie idle (e.g., a typical plant with eight lines can produce 1.5 million rounds of small arms ammunition per day).

Lot assembly

21. In order to ensure uniform performance and homogeneity, ammunition is assembled in discrete quantities known as lots or batches. Thus, a single lot is assembled in practically identical manufacturing conditions using identical components from controlled sources. A typical lot of small arms ammunition can contain from 250,000 to 1 million rounds. The lot is also the primary source of identification which enables the source of manufacture to be traced back to a particular factory, shift or production run in the event of defects arising, and also enables the components to be similarly traced. This traceability by lot is of significance not only as an internal quality control measure but also for the purposes of identification of the origin of ammunition.

Ammunition manufacturers

22. Industrial-scale manufacture of ammunition is widespread around the world and is only limited by either market forces or defence/security needs. Some countries are reluctant to disclose details of their production figures or even the number of their production companies. Therefore, most of the responses to the Group's questionnaire did not include any production figures. Existing published sources usually fail to distinguish between small-scale companies (which might only produce a narrow range of products) and large defence-industry corporations, which comprise numerous facilities for the manufacture of hundreds of ammunition products but are only counted as a "single" producer.

23. The number of companies involved in ammunition manufacture at any particular time is rapidly changing as a result of market forces involving mergers and closures. What is of significance is that the technology is widespread and geographically distributed in both developed and developing countries. It is relatively easy to transfer this technology quickly to supply a new market. Potential worldwide production capacity is therefore more relevant than the estimated number, location and current output of factories at any given time. Control measures for the transfer of such technology are therefore of critical importance.

24. Generally, small arms ammunition and light weapons ammunition is produced and marketed separately from the weapons themselves (since ammunition manufactured to a particular specification can be used in many different weapons designed to use that model/calibre of ammunition). More complex ammunition such as anti-tank and certain artillery or mortar ammunition is often designed to be used only in a particular type of weapon and thus both ammunition and weapon are usually produced by the same manufacturer and jointly marketed. Some types of ammunition and weapons are combined products (e.g., one-shot disposable weapons) and are produced and sold as single items with the ammunition pre-packed into the launcher tube.

B. Explosives manufacture

25. Because of the sensitivity of the raw materials and the finished product, safety is of great importance in explosives

manufacture. Plant buildings are separated by distance and/or blast walls. The complex mixing and processing is carried out to high tolerances and is closely monitored to ensure quality. Depending upon their use, explosives are either moved to filling plants for filling into ammunition or explosive accessories or packed into cartridges, bags or boxes for industrial use as bulk explosives.

26. Detonators are filled with primary explosives, making them very sensitive to spark, friction or heat. Because of their sensitivity, detonators are difficult and dangerous to manufacture. As a result, they are usually made only in specialized production facilities with automated filling plants.

C. Manufacture of improvised explosive devices

27. The legitimate use of explosives is central both to military and to industrial/commercial activity. It is the misuse of explosives which causes concern. The most serious problem is the misuse of military or industrial explosives and/or commonly available fuels, oxidants and explosive precursors in the manufacture of improvised explosive devices — homemade bombs. These issues are of critical importance to explosive ordnance disposal (EOD — commonly known as "bomb disposal") branches of military and police services worldwide which have to deal with the bombs that are the end result of the misuse of explosives.

28. There is a widespread use of explosive devices as weapons by extreme political groups, terrorists, criminals and disaffected individuals as well as parties to conflict situations. It is difficult to obtain reliable and comprehensive conclusions from existing data on worldwide bomb incidents,[4] since many countries regard such information as security-sensitive.

29. Improvised explosive devices vary in sophistication from simple pipe bombs to large vehicle bombs with complex electronic triggering devices and built-in anti-handling features designed to defeat any attempt to defuse the bomb by disposal personnel.

30. The knowledge required to make an effective improvised explosive device is widely available, both in the popular literature and especially on the Internet.

31. The basic components of any bomb are similar and generally include an arming/timing/triggering device or switch, an initiator (such as a detonator blasting cap) and a main charge or explosive filling with or without a booster.

32. The techniques and tools required for bomb making are simple. Basic chemical skills and equipment are required for improvised explosives manufacture and basic electrical and electronic skills and tools for the triggering of more sophisticated devices. The main raw materials are generally widely available from such diverse sources as household cleaning agents, fireworks, school laboratories, hardware stores and agricultural suppliers. Propellants can be purchased for reload purposes or obtained by emptying small arms ammunition or shotgun cartridges. Ammonium nitrate fertilizer can be converted to an effective explosive by crushing and mixing with a fuel such as sugar or diesel oil. Industrial explosives can be diverted from legitimate mining or quarrying use or stolen. The most difficult components to obtain illegally are generally high-quality detonators and military standard high explosives, although even these are often widely available in conflict and post-conflict regions or in countries where national control measures have broken down or are ineffective.

33. The effects of improvised explosive devices vary based on size, strength, degree of containment and location. In a vulnerable location, a few pounds of high explosive can break up a passenger airliner in flight, whereas a typical car bomb could contain up to 1,000 pounds (approximately 454 kg) of explosives.

IV. Legal transfers and illicit trafficking

34. Transfers of ammunition and explosives are politically sensitive. Transfer decisions are usually matters of national policy. The market demand for small arms ammunition is higher than the demand for light weapons ammunition owing to the higher rate of fire, relatively longer barrel life and hence higher-volume use of small arms compared to light weapons.

35. The main identifiable patterns of small arms and light weapons ammunition transfers are:

- Government-to-Government trade;
- Direct industry sales;
- Indirect sales through merchants and brokers;
- Donations or low-cost transfers by Governments;
- Covert transfers by Governments;
- Illicit trade (or trafficking).

A. Legal transfers

36. There exists a salient lack of centralized information and of systematic documentation or studies on the subject

of ammunition and explosives transfers. Lack of transparency hinders access to data concerning the legitimate trade. Of the few sources of information available, it would appear that most transfers are legitimate and routine.

37. The respective shares of domestic procurement and exports in the production of ammunition for small arms and light weapons vary widely from country to country. One respondent to the Group's questionnaire indicated that 99 per cent of its production was for domestic procurement, whereas another reported that 74 per cent was for export.

38. Imports and exports of small arms ammunition include not just complete ammunition rounds, but also components (bullets, cases, propellants or primers) for assembly at destination. International transfers of ammunition involve trade among producing countries (suggesting specialization in production) as well as exports by producers to States where no production takes place, as indicated by several responses to the questionnaire. Respondents included countries from which ammunition and explosives were purchased, as well as countries which were recipients of exports of such materials. The amounts of such exports and imports, however, were not disclosed by most respondents, citing national security reasons.

39. The legitimate ammunition and explosives transfer process currently in effect has been designed from a safety and security standpoint to protect the general public and the transporter. Security of the shipment is driven by economics: companies and their clients do not want to lose track of their product.[5]

40. Some countries cannot afford sophisticated tracking systems. In Africa, the rail system remains the preferred transportation method given the great distances and underdeveloped transportation infrastructures. However, in most countries in Africa rail transport is also underdeveloped. Cargoes are reported missing through theft, hijacking and lack of traffic management technology. Recently the United Nations and the European Union funded a project to computerize rail shipments, making cargo planning and tracking possible.

41. National authorities should be responsible for ensuring that transfers are legal and safe. Law enforcement is crucial to the transfer process. Whether a transfer is determined to be legitimate or not, the system depends upon laws and regulations, and appropriate authorities to enforce them.

42. In a properly regulated system, customs officers look for required documentation before a shipment is allowed in or out of a country. Transportation officials ensure that shipments are handled safely. All goods require secure storage while awaiting trans-shipment. Port authorities segregate ammunition and explosives shipments in the port area primarily for safety reasons rather than just their security. This tends to make ammunition and explosives shipments once they are in a safe storage area less accessible than other goods awaiting processing. In addition to standard shipping documents such as bills of lading, ammunition and explosives transfers require evidence of authorization of the shipment. This usually comes in the form of an export or import licence supported by an end-user certificate issued by a government agency. The agency, and in some cases the individual, issuing the end-user certificate must be recognized by the licensing agency before a licence is approved. At the international level end-user certificates serve as a nation's guarantee of authorization for a transfer. Differences in the documentation depend upon national laws and policies governing the licensing process.[6]

43. The use of electronic data interchange (EDI) by international transportation and logistics organizations is expected to enhance shipping harmonization and accelerate the customs process. This system manages all of the information required for any specific shipment and transfers the data electronically. While this promises to streamline the process, ease control and security of shipments, pitfalls found in any electronic data system would need to be overcome. Harmonization of data input and programme compatibility are two primary issues which face international logistics organizations. In addition, the technology and training needs to be made available to less developed regions to help improve their transport controls.

44. Safety and customs regulations are determined through various regulations established through international conventions. Those conventions are negotiated through international organizations such as the World Trade Organization, the World Customs Organization and the International Chamber of Commerce. States members of those organizations agree to non-binding resolutions regulating the shipment of goods. The organizations present recommendations for their members to adopt. Most often they take the form of national regulation although adopting them is voluntary. It is through those international organizations that most Governments negotiate modernization, streamlining and harmonization and transparency of international customs regulations, issues of great importance in the world of international trade.

45. A wide variety of actors engage in an arms transfer, including suppliers, buyers, brokers, bankers, customs and other law enforcement officers, government regulatory agencies and transportation companies. Suppliers can be anyone from manufacturers and their representatives to

government agencies tasked with redistributing existing stockpiles. A routine transfer has the same characteristics as any other government procurement.

46. Brokers operating in the legitimate transfer process act as facilitators between the buyer and the seller. Usually there are multiple suppliers for any given requirement. Brokers act on behalf of suppliers to assist in the bidding and procurement process.

B. Illicit trafficking

47. Illicit transfers are recorded primarily in the open domain as case studies or anecdotes, indicating that such transfers do exist on a wide geographic scale, without allowing any significant quantification of the phenomenon.

48. A general lack of training leading to poor accuracy and lack of fire discipline is characteristic of inexperienced combatants involved in many of the conflicts being fought around the world. As a result, military operations in those areas of conflict not only require weapons but also need large quantities of ammunition to go with them. Faced with embargoes and other transfer roadblocks, belligerents resort to illicit methods to fill their requirements.

49. It should be noted here that there are no substantial data linking small arms transfers to ammunition and explosives transfers. Given the large quantities of small arms ammunition required in conflicts today, experts interviewed for the present report concluded that ammunition shipments would frequently travel separately from weapons. Once the weapons are in place, ammunition resupply receives priority.

50. Drug traffickers and organized criminals pursue their goals using different methods. They need less ammunition and explosives to achieve their goals. In addition, clandestine by nature, trafficking operates via a network of known entities. Constructing or reconstructing that network presents an unnecessary risk. There is an international trend for sectors linked to drug trafficking and organized crime to act as brokers supplying terrorist groups with ammunition the consumption of which varies according to the characteristics of the groups themselves and the areas in which they operate.

51. Trafficking is carried out through a variety of methods, primarily thefts, illegal movements and "grey" transfers.[7] As a matter of international trade, illicit transfers lend themselves to a study of illegal trading practices generally. Smuggling, piracy, theft and pilfering are primary ways in which legitimate goods make their way into the illegitimate market. Research on piracy incidents of the past decade did not reveal any attacks on ammunition shipments. Thefts of military and law enforcement stocks appear to be a standard method of moving weapons and ammunition into the illicit market. Barter of drugs and other goods obtained through illegal methods is also broadly resorted to. Trafficking includes smuggling, as well as exchanges of ammunition and explosives for other illicit commodities (such as drugs, fake documents or ivory).

52. Customs officials are constantly challenged to discover the latest smuggling techniques. False documents and deceptive markings on containers are the more traditional methods. More recently customs officials have discovered the use of "twin seals" used to disguise the fact that a container has been tampered with. A legitimately sealed container which passed a customs check is opened, the contraband is placed inside and then resealed using what appears to be a legitimate customs seal with the same control number etched in it. Customs officials said this indicates collaboration from warehousemen and longshoremen as well as corrupt customs officials.

53. False end-user certificates are another way to circumvent the control system. As with other forms of smuggling, "brass-plate" companies are set up, money is transferred through multiple bank accounts and goods make their way into the legitimate shipping channels using false documentation.

54. While the parties to a conflict may need large quantities of ammunition, which implies a need for large containers of goods, shipments can be disguised using standard smuggling techniques. Containers are marked on the outside as benign while the contents may be something quite different. Corrupt customs officials and port authorities, or independent agents whose job it is to expedite the shipping process and are willing to take a bribe, help to defeat the legitimate process.

55. Just as they often are key to the legitimate trade, some brokers also service the illicit trade. During the cold war period brokers often served the Government-sanctioned "grey markets" which provided them a certain level of legitimacy. With the end of the cold war their role in the market has changed. Research indicates that a shift in the grey market has taken place. The brokers who act as a conduit into illegal trade generally have the following characteristics:

- They are often businessmen with military or security records;
- They are motivated by economic rather than political considerations;

- In parallel with arms trafficking, they are also engaged in other, legal business undertakings as "fronts";
- They have access to fake end-user certificates;
- They use illegal means of transport such as clandestine aircraft and airstrips including the use of forged flight-plans and methods for evading radars;
- In some regions, such brokers are connected with groups engaged in drug trafficking and/or organized crime, which enables them to exchange ammunition and/or explosives for drugs, fake documents, etc.
- They can also have links with corruptible officials.

56. Part of the trafficking consists in the circulation and recirculation of ammunition inherited from supplies to regions in conflict initially made during the cold war. The proximity to those stockpiles facilitates the illegal movement of ammunition into areas of conflict. Availability of pre-existing stockpiles would decrease the demand for alternative sources. Furthermore, on the international scene, other types of internal and regional conflicts have appeared where there is an obvious need for or consumption of a large amount of ammunition.

57. The illicit trade appears to seek the paths of least resistance. Whether they deal in rugs or drugs, smugglers tend to use the same routes that they have always used.

58. It seems apparent that law enforcement is the central issue in discussions on transfers and trafficking. The legitimate trade, by definition, depends on strict enforcement of existing laws and regulations. The illicit trade is dedicated to circumventing them. In the current period of increased globalization, free trade presents problems for law enforcement agencies charged with guaranteeing public safety and open trade. The international community needs to find a way to make law enforcement compatible with free trade if it plans to eliminate the illicit movement of ammunition and explosives.

V. Stocks and surpluses

A. Ammunition

59. Clear and comprehensive data on the location and extent of ammunition stocks and surpluses is lacking. Responses to the Group's questionnaire have not filled this gap. States are generally unwilling to disclose information about ammunition stockpiles for reasons of national security. Moreover, States generally do not keep precise, centralized and accessible records and accounts of existing stocks, including ammunition deemed surplus to national requirements, obsolete or unserviceable.

60. All of the available information, however, indicates that the reduction in armed forces in the post-cold war period has contributed to the existence of very large stockpiles of ammunition for small arms and light weapons in various defence inventories.[8] This trend has been strengthened by the change to smaller-calibre main assault rifles (from 7.62 mm to 5.56 mm) in several major armed forces in the world. While the resulting stockpiles cannot be quantified, their careful management, and their reduction where appropriate, are considered especially important by the Group.

B. Explosives

61. Industrial explosives differ from small arms ammunition and high-quality military explosives as they tend to have a shorter shelf-life and quicker turnover. This is particularly true of industrial explosives requiring "just-in-time" manufacture and delivery. In fact there is an increasing trend for "on site" mixing to form bulk explosive slurry from non-explosive constituents. Some industrial explosives (e.g. nitroglycerine-based, nitroguanadine-based) tend to become unstable in storage with time and especially at high temperatures and humidity. Detonators are prone to corrosion and can also become unsafe in storage. Military explosives, on the other hand tend to have good storage characteristics and can be safely stored for decades in good storage conditions. Storage of bulk explosives (military or industrial) bring inherent safety and compatibility problems which tend to become self-limiting factors so that national arsenals and industrial manufacturing and storage facilities tend to reduce such stocks to the absolute minimum necessary.

VI. Legislative control measures

A. National legislation

62. National legislation on ammunition and explosives is best described as being very diverse. Whereas in some countries existing legislation can be considered comprehensive and effective, in others legislation is inadequate or even lacking altogether. In those countries where the legislation is more comprehensive, it includes provisions on classification and definition of arms and ammunition and explosives, import and export licensing requirements, rules on purchase, possession and domestic

transfers, national registers, identification and marking, domestic application of international and regional regulations and the penalties in case of failure of observance of the rules. This applies notably to the national laws, regulations and procedures governing access by civilians' right to sell, purchase, own and use ammunition and explosives. Where such legal frameworks, however disparate, do exist at the national level, they are largely unsupported by international agreements or treaties. As a general rule, most countries not only regulate individual firearms ownership but also control the amount of ammunition an individual can have for personal use.[9]

B. Bilateral agreements

63. In some cases bilateral agreements have been signed to fight against the illegal traffic of ammunition and explosives, including the following:

- The Mexico-United States Coordination Group, established in May 1996;
- The Brazil-Paraguay Agreement, signed in October 1996, by which both countries must exchange monthly records on arms, ammunition and explosives purchases by all their legal residents;
- Some bilateral agreements also exist in Africa, notably between South Africa and Mozambique and South Africa and Swaziland. Those agreements cover cooperation between the police services of the countries concerned and include provisions for specific cooperation on ammunition and explosives.

C. Regional agreements

64. The Inter-American Convention against the Illicit Manufacturing of and Trafficking in Firearms, Ammunition, Explosives and Other Related Materials, adopted by the Organization of American States (OAS) on 13 November 1997 (hereafter "the OAS Convention"), is the first binding regional agreement explicitly addressing ammunition for small arms and light weapons, as well as explosives. The purpose of the OAS Convention is to prevent, combat and eradicate the illicit manufacture of and trafficking in firearms, ammunition, explosives and other related materials. In pursuit of these objectives, the States parties are committed to harmonizing their national legislations and to promoting and facilitating cooperation and exchanges of information and experience among themselves.

65. In support of the implementation of the OAS Convention, the States members of the Southern Cone Common Market (MERCOSUR), Bolivia and Chile are in the process of establishing a joint registration mechanism for purchasers and sellers of weapons, ammunition and explosives and other related materials. This mechanism was adopted by the heads of state during the Summit of the Americas held at Santiago on 18 April 1998.

66. In the "Regional Intelligence Community of Central America", Mexico and Central American countries have exchanged intelligence information on traffic in arms, ammunition and explosives since 1994.[10]

67. The Declaration of a Moratorium on the Importation, Exportation and Manufacture of Small Arms and Light Weapons in West Africa was adopted for an initial duration of three years by the States members of the Economic Community of West African States (ECOWAS) on 31 October 1998. Unlike the OAS Convention, the Moratorium addresses the legal trade and manufacture of small arms and light weapons. It is a voluntary measure rather than a legally binding treaty. The Moratorium itself addresses neither ammunition nor explosives. The code of conduct on the implementation of the Moratorium, elaborated in March 1999, however, does provide for strict controls by the participating States on the importation of spare parts, including ammunition for small arms and light weapons.

68. The European Union Programme for Preventing and Combating Illicit Trafficking in Conventional Arms, adopted in June 1997 makes particular reference to small arms, but neither to their ammunition nor to explosives. The European Union Code of Conduct on Arms Exports (June 1998) covers all conventional weapons without singling out small arms or light weapons. The EU Joint Action of December 1998, which builds on the former two initiatives, is designed to address specifically the EU's contribution to combating the destabilising accumulation of small arms and light weapons, but its provisions include neither ammunition for such weapons, nor explosives.

69. The Schengen Agreement[11] of 1985 calls for the signatory countries "to bring into line with the provisions of this Chapter their national laws, regulations and administrative provisions relating to the purchase, possession, sale and surrender of firearms and ammunition". The Agreement, however, covers only natural (physical individual) and legal (companies or organizations) persons rather than supplies to central and territorial authorities, the armed forces or the police.

D. Multilateral agreements

70. The Wassenaar Arrangement involves 33 States participating on a voluntary basis in export controls for conventional arms and dual-use goods and technologies. Its ammunition list classifies ammunition according to weapons categories and includes the full range of ammunition for small arms and light weapons. The Wassenaar Arrangement's participating States include some, but not all, of the world's significant producers of ammunition for small arms and light weapons.

71. The United Nations Register of Conventional Arms constitutes the broadest multilateral mechanism for promoting transparency in conventional arms transfers. Its scope, however, is limited to seven categories of major conventional weapons, excluding small arms, light weapons, their ammunition, and explosives.

72. The draft protocol against the illicit manufacturing of and trafficking in firearms, ammunition and other related materials supplementary to the draft convention on transnational organized crime which is currently being negotiated in the framework of the Vienna-based Commission on Crime Prevention and Criminal Justice is notable in that it specifically addresses ammunition for firearms. On the other hand, the current draft protocol makes no explicit mention of explosives. Furthermore, whereas the Expert Group in the present report addresses ammunition and explosives in all their aspects, including legal State-to-State transfers and manufacturing, the draft protocol's scope extends only to illicit manufacturing and trafficking. In addition, whereas the draft protocol requires appropriate marking for firearms, it does not address the marking of ammunition or explosives.

VII. Marking of ammunition and explosives

73. There is no obligatory or standardized universal system for the marking of ammunition and explosives or for the centralized registration of such marking. Markings are applied to ammunition and explosives and their packaging to provide information enabling or assisting:

- Identification and management purposes;
- Issue of the correct ammunition or explosive to the appropriate user;
- Identification by the user of the ammunition or explosive;
- The correct handling and transport of ammunition or explosives;
- The tracing of ammunition or explosives;
- Investigations into ammunition or explosives incidents.

A. Ammunition

Headstamping

74. Headstamping is usually associated with small arms ammunition, although it is also used with larger calibres. A cartridge headstamp is a marking impressed, stamped or embossed on the base of a cartridge case during the manufacturing process. The practice of headstamping is worldwide, but no single convention is used, although the standards used by the North Atlantic Treaty Organization (NATO) and the Commonwealth of Independent States (CIS) are the most widespread. Headstamps can and do therefore include any combination or selection of numerals, letters, trade marks, symbols or other codes used to identify such aspects of manufacture as country or factory of origin, year of production, and sometimes lot number and calibre. Different language characters and calendar systems are also used. The resulting patterns are of an immense diversity.

75. As there is no international obligation to apply headstamps to small arms and light weapons ammunition, dealers sometimes have ammunition especially made for them with their own trade mark but without original factory markings. Some military units also require their ammunition to be either unmarked or to bear markings in secret code to avoid traceability after covert operations. The practices of components assembly and of handloading/reloading also complicate the picture, since the headstamp may only identify the initial producer of the cartridge case.

Colour-coding and stencilling

76. Colour-coding is used to denote the role and/or hazard associated with different types of ammunition. NATO coding and CIS coding are the most widely used conventions, although they comprise national variants. The coding indicating the role of small arms ammunition (such as armour-piercing, tracer, and so on) is usually painted on the tip of the bullet. Hazard-coding colours are either applied to the entire bullet or shell, or as a strip of colour. For larger-calibre ammunition, further information (such as nature, calibre, type, manufacturer, lot and year of manufacture) is often stencilled onto the shell and cartridge in addition to colour-coding.

Packaging

77. Ammunition packaging often provides more information than the ammunition itself, provided that the ammunition can be definitely associated with the package.[12] Details of ammunition are stencilled or printed on parent packs and usually include designation, nature, calibre, type, manufacturer, year and lot of manufacture, as well as other codes associated with transport and storage safety. The information is abbreviated on the sub-packs.

B. Explosives

78. Several studies are currently in progress on the subject of combating the problem of the misuse of military and industrial explosives. These include the National Research Council report of the Committee on Marking, Rendering Inert, and Licencing of Explosive Materials and the United States Department of the Treasury/Bureau of Alcohol, Tobacco and Firearms report on the same subject.

79. Explosives (military explosives, commercial explosives and their associated accessories, including detonators/blasting caps) present particular difficulties for satisfactory marking,[13] although the wrapping and packaging of explosives are often marked with information similar to the markings on ammunition packaging.

Detection additives and devices

80. Military explosives such as plastic or sheet explosives are more difficult to detect because of their low vapour pressure and as a result they have been chosen as explosives of choice by bombers who are trying to prevent detection of improvised explosive devices (IEDs) at customs points or airports. As a result of the International Civil Aviation Organization (ICAO) Treaty of 1991, signed by 39 countries, many manufacturers of military explosives are now adding chemical markers in the manufacturing process to assist detection. A new technology also exists for detection marking of detonators and explosives involving the addition of coincident gamma-ray emitters at manufacture. This method is still under safety evaluation.

81. Rapid progress is also being made in improving the accuracy and sensitivity of detection instruments. New technologies such as vapour particle detectors, computed tomography, nuclear quadropole resonance, thermal neutron analysis, pulsed fast neutron analysis and nuclear resonance absorption are all at various stages of development and are driven by the aviation industry in a major effort to improve airline security. Cost, size and possible safety factors are limiting factors with some of these technologies at present.

82. The combination of enhanced detectability of marked explosives and the ongoing improvement in the sensitivity of detection instruments will eventually make covert movement of IEDs through security checkpoints very difficult. It should be noted, however, that many manufacturing countries have not yet signed the International Civil Aviation Organization Treaty and there are huge stocks of unmarked military explosives in existence worldwide. Furthermore, the Treaty does not apply at present to commercial boosters, detonating cords and certain cap-sensitive commercial explosives, which also have low vapour pressure and are difficult to detect. The explosives industry has reservations about the general adoption of this system owing mainly to the cost of marking compared to production costs.

Conventional markings

83. The same general comments apply here as for markings of ammunition. Conventional markings which identify designation, manufacturer, lot and year of manufacture are used for industrial and military explosive packaging and wrappings, but cannot be applied to bulk explosives and are difficult to apply to sensitive items such as detonators or explosive accessories such as safety fuse, detonating cords, etc. The problem is further complicated by the lack of international marking conventions and centralized databases for explosives and explosive components and accessories.

Taggants for pre- and post-detonation identification and tracing

84. Tagging is the addition of identification and tracing substances (known as taggants) to explosive substances. In Switzerland, where tagging is required by law, different systems are in use (e.g., 3M, HF-6 and Explo Tracer) but the basic principle is similar and consists of using particles or threads with unique combinations of coloured layers or elements which are mixed in during manufacture and can be recovered and analysed even from small traces left after detonation. The codes are changed either every six months or after production of every 300 tonnes of product, so that the explosive can be accurately identified and traced to a particular factory and date of manufacture. All codes are registered with the Swiss police. The tagging system has proved to be of great assistance to the Swiss police in solving explosives-related crime.[14]

85. In the explosives industry in countries other than Switzerland there are reservations about the general adoption

of such systems, mainly because of considerations of cost (which runs to 3–4 cents per lb. in Switzerland) but also about other issues such as cross-contamination of machinery during production, possible performance degradation or safety concerns.

VIII. Programmes for the reduction of ammunition stocks

86. Stocks are usually reduced for any of the following reasons:

- Downsizing of military forces, the termination of a conflict or the reduction of a specific security threat;
- Change in standard-issue weapons or their calibres;
- End of useful life of ammunition;
- Defective ammunition;
- Storage safety.

A. Methods of reduction

Sale

87. The sale of surplus stocks is common in military arsenals. Such sales can be intergovernmental or open to the highest bidder or tender. In the latter case, merchants or brokers may be involved. Such sales can involve large amounts of ammunition, which is normally sealed in its original packs with its original marking. Thus sales can be fully legal and subject to due import and export controls, but covert or illegal sales are also possible.

Demolition

88. Demolition involves the use of explosives to destroy ammunition stocks. This method can be expensive and labour-intensive, especially for large volumes or for widely dispersed stocks. Demolition is not suitable for small arms ammunition. However, it is often the preferred method of destroying stocks of larger-calibre ammunition whose transport would be dangerous (such as duds, or severely corroded ammunition).

Incineration

89. Incineration is the controlled burning of ammunition in a specially designed oven or furnace capable of containing the effects of the explosions entailed. Such furnaces can be simple field incinerators, which are cheap, efficient and mobile, but tend to have a small or moderate capacity and are environmentally unfriendly because of the noxious fumes which are a by-product of burning ammunition and pyrotechnics. They are only capable of incinerating small arms ammunition. At the other end of the technological scale, there also exist complex computer-controlled permanent incineration installations, which are more costly.[15]

Burning

90. The burning of ammunition or explosives can also be performed in the open. This method is suitable for propellants, pyrotechnics and for some explosives. Its disadvantages are its clear environmental unfriendliness and the fact that explosives can burn to detonation.

Dumping

91. Following the Second World War, dumping at sea was the most common method for disposing of large stocks of surplus ammunition. The practice has now been banned by international conventions. Land dumping consists in disposing of ammunition by burying it, notably in disused mineshafts and volcanoes. Dumping is cheap and can accommodate large volumes of ammunition, but its drawbacks are its environmental unfriendliness and the danger posed if the ammunition is subsequently uncovered.

Conversion

92. Conversion is technically feasible, and some ammunition producers convert hazardous ammunition into inert practice ammunition. Although expensive, this method can sometimes be cheaper than purchasing new practice ammunition.

Demilitarization

93. Demilitarization refers to a process in which ammunition is stripped down to its component parts and recycled, using as much of the material obtained as is economically feasible. Ammunition factories are increasingly turning to demilitarization as a paying service to customers for whom other methods are not practicable. Demilitarization is a rapid method for disposing of large volumes of surplus stocks. It is environmentally friendly, provided that the plant is equipped with the elaborate filters and scrubbers required to prevent the escape of noxious fumes. Metals are reused as scrap and high explosive ammunition fillings can be converted into explosives for industrial use. Propellants can be reused if chemically stable. Some firms can provide demilitarization facilities ready for

use in a foreign customer's country. On the other hand, the process can be expensive, particularly if the ammunition needs to be transported over long distances.

B. Observations on the reduction of stocks

94. The Group is of the opinion that the careful management of worldwide legitimate stocks of ammunition, including the reduction of surplus stocks, combined with active encouragement for former combatants to hand over their stocks for destruction, can reduce the negative impact of the uncontrolled proliferation of ammunition in post-conflict areas. In post-conflict situations, the handing over of ammunition and explosives by former combatants, prior to destruction using one of the methods listed above, raises similar issues as for small arms and light weapons themselves. In particular, buy-back schemes involving monetary payment in return for ammunition and/or explosives entail the risk of fuelling the black market for future purchases of weapons, ammunition or explosives. Compensation in kind (whether in goods or in development-related equipment and services) for ammunition or explosives handed over, is usually to be preferred.

95. Initiatives designed to provide information and advice on appropriate, high-volume and environmentally friendly methods for reducing stocks, with the technical and financial support of donor nations, would be a clear contribution to conflict prevention and to post-conflict peace-building.

IX. Options for control measures on ammunition and explosives

A. Options for improvements in marking

96. The marking of small arms ammunition could be improved by the global adoption of common standards whereby all headstamping would identify, at a minimum, the place, the year and the lot of manufacture. Tagging for explosives could be extended to all explosives and explosive accessories, including military explosives.

97. Such improvements would only be effective if central registries of marking and tagging codes could be kept, which could be accessed through appropriate procedures of intergovernmental information exchange.

98. Agreement on minimal international standards for marking would greatly enhance transparency by facilitating the identification and tracing of ammunition and explosives illegally used or trafficked. Agreement on the use of detection additives would also assist authorities in the detection and location of improvised explosive devices as well as illicit movements of explosives.

B. Rendering inert the chemicals used in explosive manufacture

99. The most accessible explosive chemical is ammonium nitrate and as a result of this has been used in many bombings worldwide.[16] It is relatively simple to convert fertilizer-grade ammonium nitrate to explosive-grade. Measures to render ammonium nitrate inert to prevent detonation have been investigated in the United States and Canada. This has included addition of fire retardants, textiles, polymers and limestone and other chemicals. Field results have been mixed, but generally it was found that determined bombers with basic chemical knowledge could circumvent any measures used to date. Research in this area is continuing.

C. Legal and security measures to restrict the sale/availability/use of explosives and their precursors

100. Some measures which have been used in different countries with mixed success are:

- Voluntary industrial controls;
- Showing of identification by purchasers;
- Recording of all sales by sellers;
- Licensing of users;
- Age restrictions on purchase;
- Banning import and sale of certain categories, e.g. fireworks;
- Verification of end use of explosives by police;
- Guarding of manufacture and storage sites and large consignments in transit by security forces;
- Mandatory reporting to police of sales to individual purchasers above specified quantities.

101. Precursor chemicals are chemicals which are vital to the manufacture of explosives although not necessarily explosives in themselves.[17] These chemicals are much more difficult to control than actual explosives because of their widespread legitimate use in industry, agriculture and research and educational laboratories. Some of the measures

mentioned could also be applied to the sale of precursor chemicals, especially to larger purchases.

D. Databases and information exchange on explosives incidents and improvised explosive devices

102. Information on explosive incidents (bombings, damage/casualty analysis, bomb constituents and design, thefts of explosives, finds of illegal explosive accidents involving explosives) and information regarding legitimate production, use and stocks of explosives is generally not centralized and is difficult to obtain in most countries. The Group has already encountered difficulties obtaining meaningful information on these matters in our questionnaire. Dissatisfaction with the collation of United States statistics by the Bureau of Alcohol, Tobacco and Firearms was expressed in the National Research Council report mentioned above. Such information is collected by national EOD and police organizations but is security-sensitive and not generally available. The Expert Group is not aware of any formal international database on the subject.

103. Information exchange is vital in combating the problem of misuse of explosives. Such information is generally exchanged among security forces and among EOD organizations (e.g., International Association of Bomb Technicians and Investigators) on an ad hoc basis or at international conferences. Such exchange is neither formalized nor centralized.

X. Findings and recommendations

A. Findings

104. Having found that:

- Existing information on ammunition and explosives is often fragmented between different agencies and accessible centralized records are not usually available nationally or internationally on this subject;
- Ammunition and explosives are an inseparable part of the problem of the excessive and destabilizing accumulation, transfer and misuse of small arms and light weapons;
- Measures to control small arms and light weapons would not be complete if they did not include ammunition and explosives;
- There are wide variations in the quality and range of existing control measures;
- Existing marking systems are too diverse to be adequate for tracing and control purposes;
- There is no international harmonization of relevant administrative control measures;
- Small arms and light weapons used in conflict require frequent resupply of ammunition and therefore enhanced controls on ammunition and its explosive components and on the manufacturing technology to produce them could be of particular value in dealing with the existing dissemination of small arms and light weapons and reducing the incidence of their use in conflict or post-conflict situations;
- There is a worldwide lack of accurate quantification of ammunition and explosives stocks and surpluses;
- Ammunition, explosives and improvised explosive devices are relatively easily manufactured and the knowledge, equipment and technology required is easily transferred on a global basis;
- Enhanced transparency in the fully legitimate trade in ammunition and explosives would help to identify, circumscribe and combat illicit trafficking;
- Such enhanced controls would be in the interest of licit production, trade and use, as well as in the interest of tracking and stemming illicit production, trafficking and misuse of ammunition and explosives;
- Law enforcement is key to protecting the legitimate trade and preventing and detecting illegitimate transfers, the Group of Experts on the problem of ammunition and explosives in all its aspects makes the following recommendations.

B. Prevention measures

105. For the purposes of national, regional and international information and control, the Group recommends:

(a) The adoption by States of rules, regulations and procedures for the central national collection of complete information on the production, stocks and transfers of ammunition and explosives;

(b) The collection and analysis of such data centrally in each country in a single database and the linkage of such databases on a regional and international basis;

(c) The nomination by States of a national point of contact for regional and international exchanges of information and cooperation on all aspects of the problem of ammunition and explosives;

(d) The creation of regional registers covering ammunition and explosives;

(e) The pursuit of efforts to expand the scope of the United Nations Register to small arms and light weapons, as well as ammunition and explosives;

(f) The regional and international harmonization of laws and regulations relevant to the control of ammunition and explosives;

(g) The international standardization of the form and content of end-use/end-user certificates;

(h) Encouraging states to register, regulate and approve all of the participants in the ammunition and explosives supply chain, including producers, brokers and shippers, and only to deal with similarly approved participants on a national and international level;

(i) Encouraging States to promote regular meetings among the security community and intelligence agencies for the exchange of information on the activities of illegal actors in order to improve law enforcement strategies under the aegis of the United Nations.

106. To assist in the process of identification and tracing of ammunition and explosives, the Group recommends:

(a) Encouraging the adoption of a common minimum standard for the marking of ammunition and explosives;

(b) Including in the marking of small arms ammunition at least the three following elements in a standardized format: the factory of production, the year of production, and the batch/lot of production;

(c) The investigation and use of new technologies to improve the marking of ammunition and the tracing and detection of explosives and explosive components;

(d) Encouraging regular international meetings of ammunition experts for the exchange of technical information regarding all aspects related to ammunition and explosives under the aegis of the United Nations and appropriate regional organizations.

C. Reduction measures

107. For the purposes of stock reduction and surplus disposal, the Group recommends:

(a) The systematic identification by States of stocks designated as surplus/excess/obsolete;

(b) Encouraging States to develop and apply accounting and record-keeping procedures enabling them to identify such stocks;

(c) The reduction of such excess stocks in a safe, secure and environmentally sound manner;

(d) Encouraging the development and use of appropriate demilitarization techniques and facilities;

(e) The conversion of excess production facilities where possible.

108. To assist in the process of stock reduction and surplus disposal, the Group recommends:

(a) Regional and international cooperation in stock reduction operations;

(b) Encouraging donor States to provide technical and financial assistance for stock reduction and demilitarization programmes where local resources are insufficient;

(c) Encouraging regional cooperation, including information sharing and shared access to appropriate facilities for such reduction programmes, as well as for conversion.

D. United Nations activities

109. The Group recommends that the problem of ammunition and explosives be fully integrated into the following United Nations activities on small arms and light weapons:

(a) The future study on "the feasibility of establishing a reliable system for marking all such [small arms and light weapons] from the time of their manufacture", the future study on "the feasibility of restricting the manufacture and trade of such [small arms and light weapons] to the manufacturers and dealers authorized by States", and of establishing a database of such authorized manufacturers and dealers, as well as on the agenda of the international conference on the illicit arms trade in all its aspects scheduled to take place no later than 2001.[18]

(b) Further work, including field research on matters related to the transfer, use, stocks management and reduction of ammunition and explosives in conflict-prone areas.

110. The Group also recommends the creation of a United Nations advisory group on ammunition and explosives in

order to enhance coordination and implementation of United Nations activities regarding ammunition and explosives. Such a group should have the following functions:

- Establishment and updating of a United Nations database on ammunition and explosives;
- Convening of meetings and point of contact for technical advice and information;
- Field assessment of problems related to surplus stocks;
- Technical advice and assistance on stock reduction programmes;
- Technical assistance and exchange of information to countries with less developed ammunition and explosives management systems;
- Coordination of technical and administrative training of personnel on relevant aspects of ammunition and explosives;
- Initiation of further studies related to problems identified in the present report.

Notes

[1] Argentina, Barbados, Brazil, Canada, Cyprus, Czech Republic, Denmark, Ecuador, Finland (letter indicating that no response would be provided), France, Ireland, Lebanon, Lithuania, Luxembourg, Malta, Mauritius, Monaco, Nepal, New Zealand, Oman, Phillippines, Portugal, Republic of Korea, Russian Federation, Samoa, San Marino, Slovakia, South Africa, Spain, United Kingdom of Great Britain and Northern Ireland, Uruguay and Yugoslavia.

[2] An explosive is any substance, which, when initiated, produces a sudden release of energy and gases causing heat and external pressure waves. Explosives are classed as "high" or "low" depending upon the speed of chemical reaction. The reaction in a high explosive is almost instantaneous and gives rise to a disruptive shock wave through the material; the process is called a "detonation". Shell, mine and bomb fillings are usually filled with "high explosives", whereas propellants are classed as "low explosives".

[3] Detonators are small metallic tubes containing very sensitive explosives which are initiated either by electric current (electric detonators) or heat (ordinary or igniferous detonators) or by striking (percussion detonators). The detonator is a vital item in starting the "explosive train" which ultimately causes the main explosive charge to detonate.

[4] In Northern Ireland there were over 17,000 incidents involving explosives between 1969–1997. In the United States of America there were over 50,000 such incidents between 1976 and 1995.

[5] For example, transport companies in the United States rely on global positioning systems (GPS) to monitor ammunition and explosives shipments. At any given time, United States shippers can determine the precise location of a container, not only within the United States but anywhere in the world. This system of transportation control depends upon shipment integrity. Shipping data might not reflect reality if a shipment were consolidated or its original configuration had been altered along the way.

[6] End-use certificate: documentation which proscribes the use of *matériel* intended for transfer. End-user certificate: documentation used to verify the recipient of a transfer. International import certificate: document used to guarantee that the importer does not intend to divert, re-export or trans-ship imported material.

[7] "Grey markets" operate at the juncture between licit transfers and illicit trafficking. They comprise the following types of transactions in ammunition and/or explosives:

- Re-export of materials previously purchased legitimately;
- Triangulation of materials in contravention of end-use and/or end-user certificates;
- Commercialization by a broker who coordinates the operation between a supplier and a recipient (be it a State or a sub-national/transnational group).

[8] The stockpile of conventional ammunition in the United States as of 1994 has been estimated at a value of $80 billion, of which $31 billion was considered excess. See "Defense Ammunition, Significant Problems Left Unattended Will Get Worse", General Accounting Office, United States, report to Congressional requesters (GAO-NSIAD-96-129 Defense Ammunition, June 1996).

[9] The United States is a major exception to this rule. Firearms sales are regulated but ammunition sales are not. Although security is a priority concern for shippers, diversion, i.e., theft, is not an issue in the United States because as a commodity ammunition is readily available. Many shooting sports enthusiasts reload their own ammunition.

[10] Antonio Garcia Revilla, "Interrelationship between Small Arms Trafficking, Drug Trafficking and Terrorism", in: *Curbing Illicit Trafficking in Small Arms and Sensitive Technologies: an Action-Oriented Agenda*" (UNIDIR, Geneva 1998).

[11] The parties to the Schengen Agreement are: Austria, Belgium, France, Germany, Greece, Italy, Luxembourg, the Netherlands, Portugal and Spain.

[12] Ammunition is normally packaged into sub-packs (typically cardboard boxes of 20 rounds/cartridges for small arms ammunition, or individual cylinders for larger calibres). These sub-packs are in turn loaded into parent packs (typically wood or steel, holding 1,000 to 1,500 rounds of small arms ammunition) which can be lifted by one person. Parent packs are then often grouped into 1,000-kg pallet loads for mechanical handling.

[13] The bulk explosive material itself is amorphous and difficult to mark. Detonators when filled are extremely sensitive and are dangerous to stamp or process through a stencilling procedure. Colour-coded wires are sometimes used for electric detonators to describe characteristics but they rarely give information on origin. Detonating cord and safety fuse have a very small diameter and are difficult to mark. Identification of explosives after an explosion is even more difficult since only chemical traces will normally be left at the scene with perhaps some remnants of a detonator tube or wiring.

[14] Explosives tagging was adopted in Switzerland in 1980 under the Swiss Federal Act of Explosives for Civil Purposes, which required all blasting products to be tagged. Taggants have since been used successfully in a full spectrum of explosive products, including dynamite, black powder, plastic explosives, slurries, gels, safety fuse, detonating cord and ammonium nitrate mixes.

[15] Such advanced incinerators have a high capacity (of the order of 500 rounds of small arms ammunition per minute), can operate with large-calibre ammunition and are generally environmentally friendly since they use effective filters and fume scrubbers.

[16] E.g., The Federal Building, Oklahoma City; Canary Wharf, London; Omagh, Northern Ireland.

[17] The main precursor chemicals of concern are: ammonium nitrate, sodium nitrate, potassium nitrate, nitromethane, concentrated nitric acid, concentrated hydrogen peroxide, sodium chlorate, potassium chlorate, potassium perchlorate as well as the widely used chemicals acetone, ammonia, benzene, butane, ethylene glycol, glycerine, iodine, methane, nitric perchloric and sulphuric acids, urea, toluene, lead, mercury and silver.

[18] As recommended by the Panel of Governmental Experts on Small Arms in its report (A/52/298) and by the General Assembly in its resolution A/53/77 E of 4 December 1998 on "Small arms".

Annex

Main components of the round/cartridge of small arms

Bullet

This can be of a single heavy metal such as lead or, in many military designs, a composite of an outer envelope of brass/copper and an inner core of lead sometimes with a steel tip. The shape of the bullet can vary from ogival shape with a pointed tip to a cylinderical shape with a flat tip. The shape and composition of the bullet affect the ballistic flight (called external ballistics) and dictate the effect on striking the target (called terminal ballistics).

Cartridge case

This is the largest single component and comprises a metal (normally brass but sometimes steel) cylindrical tube which holds the bullet at the neck and the propellant charge inside and houses the primer in its base. The outer circumference of the base of the cartridge case normally has a groove and rim to assist in extraction from the weapon after firing.

Cap (primer)

This consists of a small metal cup containing a sensitive explosive, which, when pinched or struck by the firing pin of the weapon, causes a flash to ignite the main propellant.

Propellant charge

This consists of granular material which burns rapidly to produce the sudden gas expansion which drives the bullet out of the weapon. Stabilizer is added to preserve the shelf-life of the ammunition. The propellant destabilizes slowly over time, leading eventually to erratic performance and in extreme circumstances to spontaneous combustion of the propellant. This process of destabilization is accelerated by high humidity, wide temperature fluctuations and exposure of ammunition out of its packing. The same conditions also cause the metal components to corrode. Under good storage conditions (i.e., stable temperate temperatures and low humidity combined with properly sealed packing), small arms ammunition can last 50 years or more without significant deterioration.